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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary**Application No.**

10/622,113

Applicant(s)

POHJOLA ET AL.

Examiner

LI LIU

Art Unit

2613

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 June 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1.4.8-16, 19-21, 23, 30 and 32-42 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1.4.8-16, 19-21, 23, 30, 32-36, 41 and 42 is/are rejected.
- 7) ☒ Claim(s) 37-40 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 November 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 6/10/08, 6/16/08
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submissions filed on 5/16/2008 and 6/16/2008 have been entered.

Response to Arguments

2. Applicant's arguments with respect to claims 1, 4, 8-16, 19-21, 23, 30, 32-42 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

3. Claim 1 is objected to because of the following informalities: "a hub;" should be added before the "a passive kerb location". The phrase "a hub" was in the original claim 1, and the newly amended claim 1 does not show that the phrase is deleted; in lines 17-19 of the newly amended claim, applicant states "wherein the optical router is configured to route wavelength channels to the hub", therefore, it is believed that the phrase "a hub" is mistakenly omitted. Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1, 35, 36, 41 and 42 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

1). Claim 1 recites the limitation "the hub" in lines 18-19. There is insufficient antecedent basis for this limitation in the claim.

2). Claim 35, and thus depending claims 36, 41 and 42, is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: receiving an injection light at the upstream side of the passive kerb location; splitting the injection light into injection light having the first wavelength and the second wavelength; routing the split injection lights to the optically pumped sources.

In claim 35, applicant claims an method of optically routing optical data at a passive kerb location from two network units to a hub; two optically pumped sources are used to convert the data modulated pumping lights to two data modulated transmission lights, respectively. However, since the kerb location is "passive" (no supply of electricity), the kerb location must receive injection light from an injection source outside the passive kerb location and split the injection light according to the wavelength and route the injection light having different wavelength to the respective optically pumped source, then the passive kerb location can convert the data modulated pumping lights to

two data modulated transmission lights. The steps of receiving, splitting and routing the injection light are critical or essential, without these steps, the passive kerb location cannot convert the received data modulated pumping lights to the data modulated transmission lights having different wavelength.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1, 4, 8-10, 13-16, 19, 21, 23, 30, 32 and 33 rejected under 35 U.S.C. 103(a) as being unpatentable over Morales et al (US 5,706,111) in view of Kim et al (Kim et al: "A Low-Cost WDM Source with ASE Injected Fabry-Perot Semiconductor Laser", IEEE Photonics Technology Letters, Vol. 12, No. 8, August 2000, page 1067-1069) and Stubkjaer (Stubkjaer: "Semiconductor Optical Amplifier-Based All-Optical Gates for High-Speed Optical Processing", IEEE Journal on Selected Topics in Quantum Electronics, Vol. 6, No. 6, November/December 2000, pages 1428-1435).

1). With regard to claim 1, Morales et al discloses an optical data transmission system (e.g., Figures 2 and 3), comprising:

a kerb location (the access node AN in Figure 2) having an optical router (the multiplexer in the AN and the optical access board OAB: column 4, line 27, and column 5 line 22-23, the multiplexer multiplexes the m different wavelengths over one of the

optical fibers to the CE) and a plurality of optically pumped sources (e.g., the OAB in Figure 2; Morales et al discloses that "the conversion to electrical signals takes place only in the network terminating equipment to which the subscriber terminals are connected", column 3, line 63-65; and "consideration is being given to the need for using completely optical networks in which both transmission and switching take place in the optical domain, thereby avoiding the successive opto-electrical conversion stages that occur in present networks", column 1, line 16-20; therefore, a plurality of optically pumped sources are presented in the AN); and

a plurality of optical network units (e.g., the optical network terminals ONT in Figure 2) each corresponding to one of the plurality of optically pumped sources (e.g., OAB in Figure 2), wherein each optical network unit has a laser for producing data modulated pumping light for transmission to its respective optically pumped source (the laser in each ONT generates data modulated pumping light, e.g., λ_a , or λ_d or λ_e in Figure 2, to the OAB);

wherein the optical router is configured to route wavelength channels to the hub (the optical router: multiplexer in the AN and the optical access board OAB: column 4, line 27, and column 5 line 22-23; the multiplexer multiplexes the m different wavelengths over one of the optical fibers to the CE or hub), and

wherein the data modulated pumping light is passively converted into the distinct wavelength channels, performed without any intermediate conversion to or from an electrical signal (Morales et al discloses that "the conversion to electrical signals takes place only in the network terminating equipment to which the subscriber terminals are

connected", column 3, line 63-65; and "consideration is being given to the need for using completely optical networks in which both transmission and switching take place in the optical domain, thereby avoiding the successive opto-electrical conversion stages that occur in present networks", column 1, line 16-20; therefore, the data modulated pumping light is passively converted into the distinct wavelength channels, performed without any intermediate conversion to or from an electrical signal).

But, Morales et al does not expressly state that the kerb location is a passive kerb location; wherein each optically pumped source of the plurality of optically pumped sources is configured to receive injection light from an injection source outside the passive kerb location and to receive the data modulated pumping light from its respective optical network unit and configured to form data modulated transmission light at a predefined wavelength range assigned to its respective optical network unit wherein the data modulated transmission light is based on the injection light and the data modulated pumping light, wherein each predefined wavelength range corresponds to a distinct wavelength channel.

However, Kim et al teaches a plurality of injection locking sources (e.g., F-P SLD in Figures 1 and 5) configured to receive injection light from an injection source (the Broad-band ASE source in Figures 1 and 5) outside the passive kerb location and to receive the data modulated pumping signal (e.g., the PRBS in Figure 1) from its respective optical network unit and configured to form data modulated transmission light (the light sent from F-P SLD to the AWG) at a predefined wavelength range assigned to its respective optical network unit (Figure 5) wherein the data modulated transmission

light is based on the injection light and the data modulated signal, wherein each predefined wavelength range corresponds to a distinct wavelength channel (the AWG slices the broad band ASE source and routes the individual wavelength to respective F-P SLD).

But, Kim et al does not expressly state that the data signal used to pump the F-P SLD is an optical signal, or the F-P SLD is "optically pumped source".

However, to use an optical data signal to pump an injection locking source is well known in the art. Stubkjaer teaches an optical wavelength converter (e.g., Figure 1a) in which a data signal λ_1 pumps the optically pumped source (Optical gate, the injection light is CW light λ_2).

Morales et al teaches that the wavelength converter or optically pumped source can be placed at the kerb location (e.g., AN in Figure 2). The combination of Kim et al and Stubkjaer teach an optically pumped injection locked light source. And Kim et al and Stubkjaer teach a cost-effective and highly reliable and flexible optical system. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the injection locking light source as taught by Kim et al and Stubkjaer to the access node (or kerb location) of Morales et al so that a passive kerb location can be obtained and a cost-effective and highly reliable and flexible network can be realized.

2). With regard to claim 4, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 1 above. And Morales et al further discloses wherein the data modulated pumping light is within a wavelength range which does not

include the wavelength or wavelengths of the wavelength channels (the wavelength of the data signal as pump signals is λ_a , or λ_d or λ_e , and the wavelength channels are λ_1 , λ_2 , ... λ_m , Figure 2 of Morales).

3). With regard to claim 8, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 1 above. And Morales et al further discloses wherein respective ones of the optical network units are sufficiently similar that they are interchangeable (column 3, line 13-18, and column 4 line 59-67, the ONTs are identical to each other).

4). With regard to claim 9, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 1 above. And Morales et al and Kim et al and Stubkjaer further discloses wherein the optically pumped sources are injection locked lasers (the F-P SLD as in Figures 1 and 5 of Kim) configured to receive injection light (the light from the Broad-band ASE source in Figures 1 and 5), wherein the injection source of the injection light is upstream from the passive kerb location (e.g., the injection light is from the center office, Figure 5).

5). With regard to claim 10, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 1 above. And Morales et al and Kim et al and Stubkjaer further discloses wherein an injection wavelength is selected by a wavelength division multiplexer and/or an arrayed waveguide grating (e.g., the AWG in Figure 1 and 5 of Kim et al select the injection wavelength).

6). With regard to claim 13, Morales et al and Kim et al and Stubkjaer to disclose all of the subject matter as applied to claim 1 above. And Morales et al further discloses

wherein the data modulated pumping light is at a wavelength different from the wavelength of light which is used to carry data traffic in upstream from the kerb location and downstream from the hub (the wavelength of the data signal as pump signals is λ_a , or λ_d or λ_e , and the wavelength used to carry data traffic in upstream and downstream directions are $\lambda_1, \lambda_2, \dots, \lambda_m$, Figure 2 of Morales).

7). With regard to claim 14, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 1 above. And Morales et al further discloses wherein the optical router is a wavelength division multiplexer multiplexer (the multiplexer in the AN/OAB, the multiplexer multiplexes the m different wavelengths, $\Sigma\lambda_i$, over one of the optical fibers to the CE: column 4, line 27, and column 5 line 22-23).

8). With regard to claim 15, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 1 above. And Morales et al and Kim et al and Stubkjaer further discloses wherein the optical router is an arrayed wavelength grating (e.g., the AWG in Figure 1 and 5 of Kim et al can be the optical router).

9). With regard to claim 16, Morales et al discloses a method of optically transmitting data, the method comprising:

receiving data modulated pumping light from a plurality of optical network units (e.g., Figure 2, the access node AN receives data modulated pumping light, e.g., λ_a , or λ_d or λ_e from the ONTs) at a kerb location (the access node AN in Figure 2) in an optical data transmission system (e.g., Figures 2 and 3), wherein the kerb location comprises a plurality of optically pumped sources each assigned to a respective optical network unit (e.g., Figure 2, each OAB is assigned to respective ONU);

wherein each optical network unit is assigned a distinct predefined wavelength range for its data modulated transmission light corresponding to a distinct wavelength channel (the wavelength of the data signal as pump signals is λ_a , or λ_d or λ_e , and the wavelength channels are $\lambda_1, \lambda_2, \dots, \lambda_m$, Figure 2 of Morales), wherein the converting is performed without an intermediate conversion to or from an electrical signal (Morales et al discloses that "the conversion to electrical signals takes place only in the network terminating equipment to which the subscriber terminals are connected", column 3, line 63-65; and "consideration is being given to the need for using completely optical networks in which both transmission and switching take place in the optical domain, thereby avoiding the successive opto-electrical conversion stages that occur in present networks", column 1, line 16-20; therefore, the data modulated pumping light is passively converted into the distinct wavelength channels, performed without any intermediate conversion to or from an electrical signal); and

routing the wavelength channels each having distinct predefined wavelength ranges assigned to respective optical network units for transmission to a hub with a passive optical router (the optical router: multiplexer in the AN and the optical access board OAB: column 4, line 27, and column 5 line 22-23; the multiplexer multiplexes the m different wavelengths over one of the optical fibers to the CE or hub).

But, Morales et al does not expressly state that the kerb location is a passive kerb location; and receiving injection light from an injection source at the passive kerb location, wherein each optically pumped source includes a laser cavity configured to select a distinct resonance peak of an incident light, the optically pumped sources

configured to form data modulated transmission light based on the injection light and the data modulated pumping light; and passively converting the data modulated pumping light from each optical network unit into data modulated transmission light based on the injection light and the data modulated pumping light.

However, Kim et al teaches a plurality of injection locking sources (e.g., F-P SLD in Figures 1 and 5) configured to receive injection light from an injection source (the Broad-band ASE source in Figures 1 and 5) outside the passive kerb location. The injection locked sources (the F-P SLD in Figures 1 and 5) including a plurality of laser cavities (Fabry-Perot Laser cavity in Figures 1 and 5) configured to select a distinct resonance peak of an incident light (the injection light from the broad-band source and AWG determine the appropriate resonance peak of the F-P laser, Figure 2); and injection locking sources configured to form data modulated transmission light based on the injection light and the data pumping signal (Figure 1 and 5); and passively converting the data signals from each optical network unit (the ONU in Figures 1) into data modulated transmission light based on the injection light and the data signals (the signals sent from F-P SLD to the AWG).

But, Kim et al does not expressly state that the data signal used to pump the F-P SLD is an optical signal, or the F-P SLD is "optically pumped source".

However, to use an optical data signal to pump an injection locking source is well known in the art. Stubkjaer teaches an optical wavelength converter (e.g., Figure 1a) in which a data signal λ_1 pumps the optically pumped source (Optical gate, the injection light is CW light λ_2).

Morales et al teaches that the wavelength converter or optically pumped source can be placed at the kerb location (e.g., AN in Figure 2). The combination of Kim et al and Stubkjaer teach an optically pumped injection locked light source. And Kim et al and Stubkjaer teach a cost-effective and highly reliable and flexible optical system. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the injection locking light source as taught by Kim et al and Stubkjaer to the access node (or kerb location) of Morales et al so that a passive kerb location can be obtained and a cost-effective and highly reliable and flexible network can be realized.

10). With regard to claim 19, Morales et al discloses an optical data transmission system (e.g., Figures 2 and 3), comprising:

receiving means for receiving data modulated transmission light, at a passive kerb location from a plurality of optical network units (e.g., Figure 2, the access node AN receives data modulated pumping light, e.g., λ_a , or λ_d or λ_e from the ONTs), wherein the kerb location comprises a plurality of optically pumped sources each assigned to a respective optical network unit (e.g., Figure 2, each OAB is assigned to respective ONU).

converting means (e.g., the OAB in Figure 2) for passively converting the data modulated transmission light from each optical network unit into data modulated transmission light (the wavelength of the data signal as pump signals is λ_a , or λ_d or λ_e , and the data modulated transmission light are $\lambda_1, \lambda_2, \dots, \lambda_m$, Figure 2 of Morales), wherein each optical network unit is assigned a predefined wavelength range for its

data modulation transmission light corresponding to a distinct wavelength channel (λ_1 , λ_2 , ... λ_m , Figure 2 of Morales), wherein the converting is performed without any intermediate conversion to or from an electrical signal (Morales et al discloses that "the conversion to electrical signals takes place only in the network terminating equipment to which the subscriber terminals are connected", column 3, line 63-65; and "consideration is being given to the need for using completely optical networks in which both transmission and switching take place in the optical domain, thereby avoiding the successive opto-electrical conversion stages that occur in present networks", column 1, line 16-20; therefore, the data modulated pumping light is passively converted into the distinct wavelength channels, performed without any intermediate conversion to or from an electrical signal); and

routing means for routing the wavelength channels having predefined wavelength ranges assigned to respective optical network units for transmission to a hub with an optical router (the optical router: multiplexer in the AN and the optical access board OAB: column 4, line 27, and column 5 line 22-23; the multiplexer multiplexes the m different wavelengths over one of the optical fibers to the CE or hub).

But, Morales et al does not expressly state that the kerb location is a passive kerb location; and the optically pumped source includes a laser cavity configured to select a distinct resonance peak of an incident light, the optically pumped sources configured to form data modulated transmission light based on the injection light and the data modulated pumping light; converting means for passively converting the data

modulated transmission light from ONU into data modulated transmission light based on the injection light and the data modulated pumping light.

However, Kim et al teaches a plurality of injection locking sources (e.g., F-P SLD in Figures 1 and 5) configured to receive injection light from an injection source (the Broad-band ASE source in Figures 1 and 5) outside the passive kerb location. The injection locked sources (the F-P SLD in Figures 1 and 5) including a plurality of laser cavities (Fabry-Perot Laser cavity in Figures 1 and 5) configured to select a distinct resonance peak of an incident light (the injection light from the broad-band source and AWG determine the appropriate resonance peak of the F-P laser, Figure 2); and injection locking sources configured to form data modulated transmission light based on the injection light and the data pumping signal (Figure 1 and 5); and passively converting the data signals from each optical network unit (the ONU in Figures 1) into data modulated transmission light (the signals sent from F-P SLD to the AWG) based on the injection light and the data signals.

But, Kim et al does not expressly state that the data signal used to pump the F-P SLD is an optical signal, or the F-P SLD is "optically pumped source".

However, to use an optical data signal to pump an injection locking source is well known in the art. Stubkjaer teaches an optical wavelength converter (e.g., Figure 1a) in which a data signal λ_1 pumps the optically pumped source (Optical gate, the injection light is CW light λ_2).

Morales et al teaches that the wavelength converter or optically pumped source can be placed at the kerb location (e.g., AN in Figure 2). The combination of Kim et al

and Stubkjaer teach an optically pumped injection locked light source. And Kim et al and Stubkjaer teach a cost-effective and highly reliable and flexible optical system. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the injection locking light source as taught by Kim et al and Stubkjaer to the access node (or kerb location) of Morales et al so that a passive kerb location can be obtained and a cost-effective and highly reliable and flexible network can be realized.

11). With regard to claim 21, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 16 above. And Morales et al further discloses the method comprising optically pumping, at the kerb location, the plurality of optically pumped sources with the plurality of respective data modulated pumping light (the data signals as pump signal are optical signals with wavelength λ_a , or λ_d or λ_e , Figure 2 of Morales).

12). With regard to claim 23, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 16 above. And Morales et al further discloses wherein the data modulated pumping light signals are within a wavelength range which does not include the wavelength or wavelengths of the wavelength channels (the wavelength of the data signal as pump signals is λ_a , or λ_d or λ_e , and the wavelength used to carry data traffic in upstream and downstream directions are λ_1 , λ_2 , ... λ_m , Figure 2 of Morales).

13). With regard to claim 30, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 19 above. And Morales et al further

discloses the method comprising pumping means for optically pumping the plurality of optically pumped sources at the kerb location (e.g., the optical wavelength converter in OAB Figure 2 of Morales et al).

14). With regard to claim 32, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 19 above. And Morales et al further discloses wherein the optical signals are within a wavelength range which does not include the wavelength or wavelengths of the wavelength channels (the wavelength of the data signal as pump signals is λ_a , or λ_d or λ_e , and the wavelength used to carry data traffic in upstream and downstream directions are $\lambda_1, \lambda_2, \dots \lambda_m$, Figure 2 of Morales).

15). With regard to claim 33, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 19 above. And Morales et al and Kim et al and Stubkjaer further discloses wherein the injection light is amplified spontaneous emission noise produced by an upstream preamplifier (e.g., the broad-band ASE source of Kim et al).

8. Claims 11, 12, 20 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morales et al (US 5,706,111) and Kim et al (Kim et al: "A Low-Cost WDM Source with ASE Injected Fabry-Perot Semiconductor Laser", IEEE Photonics Technology Letters, Vol. 12, No. 8, August 2000, page 1067-1069) and Stubkjaer (Stubkjaer: "Semiconductor Optical Amplifier-Based All-Optical Gates for High-Speed Optical Processing", IEEE Journal on Selected Topics in Quantum Electronics, Vol. 6,

No. 6, November/December 2000, pages 1428-1435) as applied to claims 1, 9, 10 above, and in further view of Zah (US 6,434,175).

1). With regard to claim 11, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 1 above. But Morales and Kim et al and Stubkjaer do not expressly disclose wherein the optically pumped sources are external cavity lasers.

However, the external cavity laser is well known in the art. Zah teaches such a laser, a multiwavelength laser includes a multiplexer (inside the laser cavity) for providing wavelength accuracy and reflectors for forming laser cavity (Figure 1, column 2, line 5-10, and column 3 line 58 to column 4 line 34). Zah teaches a plurality of optical gain sources (e.g., the optical gain medium 118 in Figure 1), the optical gain sources each comprising a external laser cavity (laser cavity 142 is formed by the mirror 136 and facet 332 in Figure 1), mirrors defining the cavity (the mirror 136 and facet 332 define the external cavity).

Zah provide laser with a high wavelength accuracy and selectivity, simplified packaging and compactness, without complications, to support the DWDM applications. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the external cavity laser as taught by Zah to the system of Morales et al and Kim et al and Stubkjaer so that a compact, high wavelength accuracy and selectivity multiwavelength laser system can be obtained.

2). With regard to claim 12, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claims 1, 9 and 10 above. But Morales and Kim et al

and Stubkjaer do not expressly disclose wherein the optical router is within a laser cavity of at least one optically pumped source.

However, Zah teaches a multiwavelength laser system, a multiwavelength laser includes a multiplexer (inside the laser cavity, can be viewed as a optical router) for providing wavelength accuracy and reflectors for forming laser cavity (Figure 1, column 2, line 5-10, and column 3 line 58 to column 4 line 34). Zah teaches a plurality of optical gain sources (e.g., the optical gain medium 118 in Figure 1), the optical gain sources each comprising a laser cavity (laser cavity 142 is formed by the mirror 136 and facet 332 in Figure 1), mirrors defining the cavity (the mirror 136 and facet 332 define the cavity).

Zah provides a laser system with a high wavelength accuracy and selectivity, simplified packaging and compactness, without complications, to support the DWDM applications. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the multiplexer/router within the laser cavity as taught by Zah to the system of Morales and Kim et al and Stubkjaer et al so that a compact, high wavelength accuracy and selectivity WDM system can be obtained.

3). With regard to claim 20, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 1 above. But Morales and Kim et al and Stubkjaer do not expressly disclose the optically pumped sources each comprising a laser cavity, mirrors defining the cavity, and wavelength selective elements inside the cavity.

However, a laser cavity with the wavelength selective element inside, such as the phasor laser, is well known and widely practice in the art. Zah teaches such a laser, a multiwavelength laser includes a multiplexer (inside the laser cavity) for providing wavelength accuracy and reflectors for forming laser cavity (Figure 1, column 2, line 5-10, and column 3 line 58 to column 4 line 34). Zah teaches a plurality of optical gain sources (e.g., the optical gain medium 118 in Figure 1), the optical gain sources each comprising a laser cavity (laser cavity 142 is formed by the mirror 136 and facet 332 in Figure 1), mirrors defining the cavity (the mirror 136 and facet 332 define the cavity), and wavelength selective elements (the phasor multiplexer 320 inside the cavity).

Kim et al and Stubkjaer teach a cost-effective WDM PON system. Zah provides laser with a high wavelength accuracy and selectivity, simplified packaging and compactness, without complications, to support the DWDM applications. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the laser cavity as taught by Zah to the system of Morales et al and Kim et al and Stubkjaer so that a cost-effective, compact, high wavelength accuracy and selectivity multiwavelength laser system can be obtained.

3). With regard to claim 34, Morales et al and Kim et al and Stubkjaer and Zah disclose all of the subject matter as applied to claims 1 and 11 above. And Zah further disclose wherein the external cavity laser is formed from narrow band reflectors. (e.g., the DBR 936 in Figure 8; although Zah calls the DBR 936 a broad band mirror, the DBR 936 can be viewed as a narrow band reflectors with respect to the broad band ASE source. In applicant's disclosure, the "narrow band reflectors", e.g., the reflector in

Figure 8 or 1020 in Figure 10, have to pass all wavelengths λ_1 to λ_k , therefore, the reflector is not exactly "narrowband" reflector in conventional definition).

Allowable Subject Matter

9. Claims 37-40 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LI LIU whose telephone number is (571)270-1084. The examiner can normally be reached on Mon-Fri, 8:00 am - 5:30 pm, alternating Fri off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Li Liu
August 16, 2008

/Kenneth N Vanderpuye/
Supervisory Patent
Examiner, Art Unit 2613